Jan. 25, 1944. J. A. GOODMAN 2,340,266

FULL FASHIONED STOCKING AND METHOD OF PRODUCING SAME

Filed May 24, 1940 5 Sheets-Sheet 1

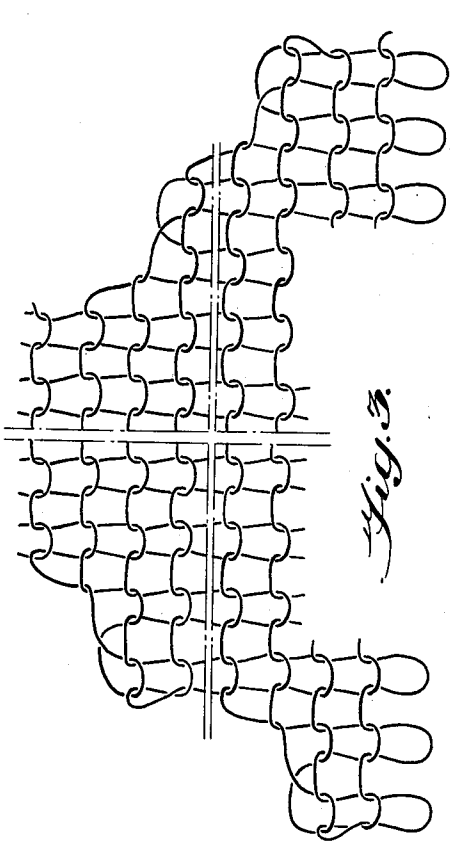


Fig. 3.

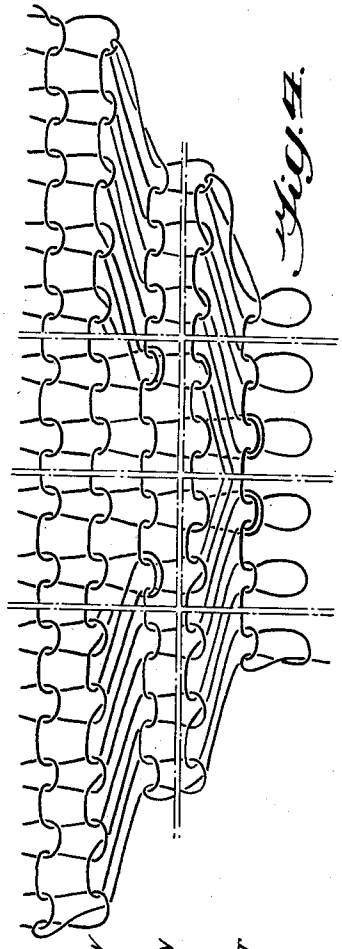


Fig. 4.

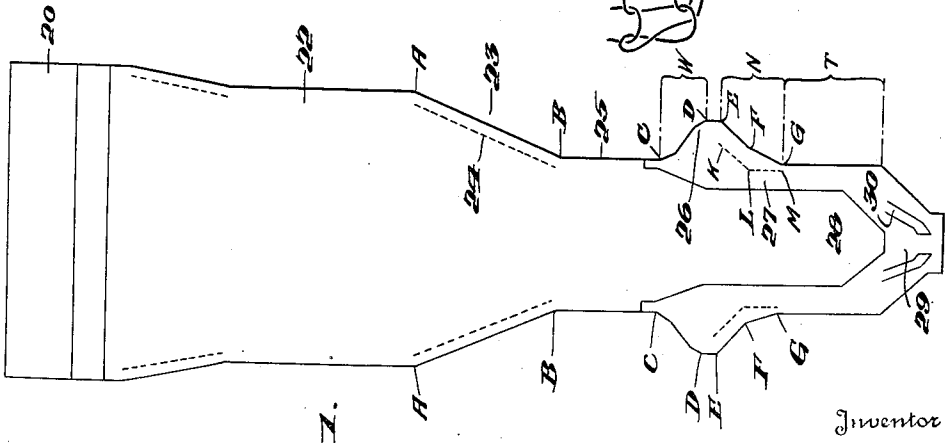


Fig. 1.

Inventor

J. A. GOODMAN,

By Edmund A. Parry Jr.

Attorney

Jan. 25, 1944. J. A. GOODMAN 2,340,266

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Filed May 24, 1940 5 Sheets-Sheet 2

Fig. 2c.

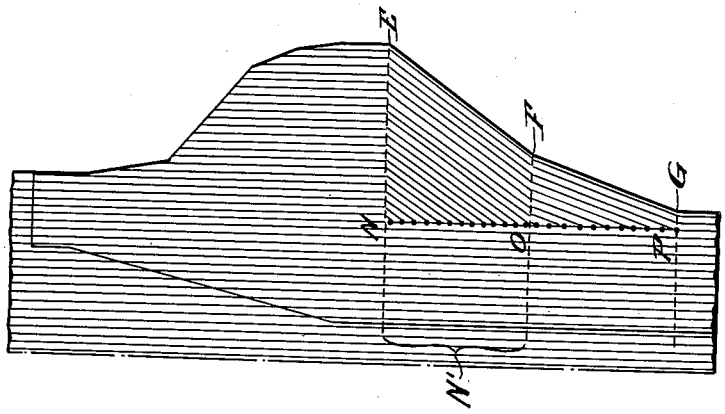


Fig. 2b.

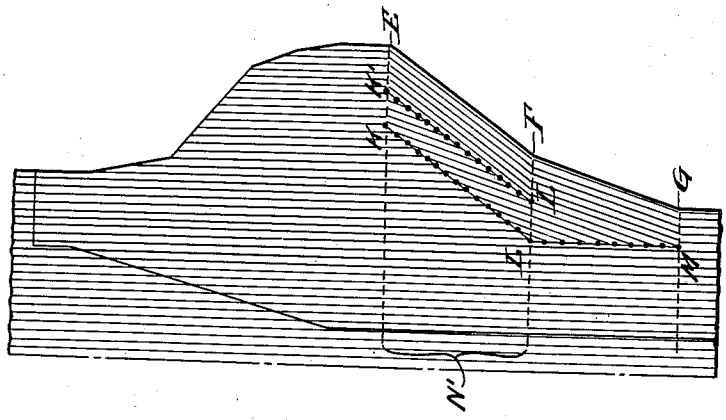
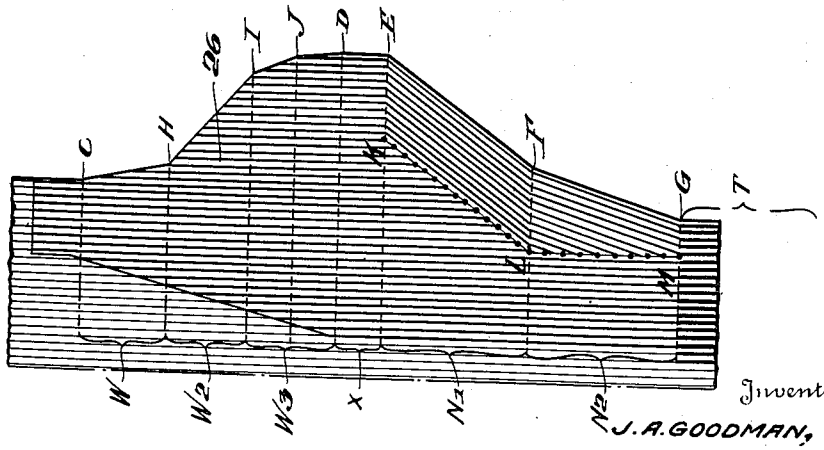


Fig. 2a.



Inventor
J. A. GOODMAN,

By Edmund H. Pamph
Attorney

Jan. 25, 1944. J. A. GOODMAN 2,340,266

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Filed May 24, 1940 5 Sheets-Sheet 3

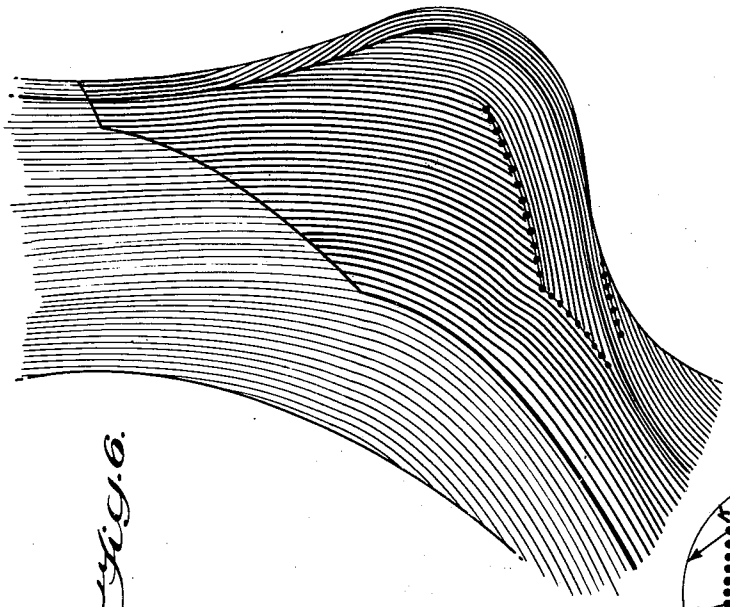


Fig. 6.

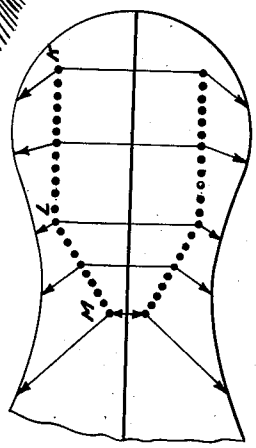


Fig. 7.

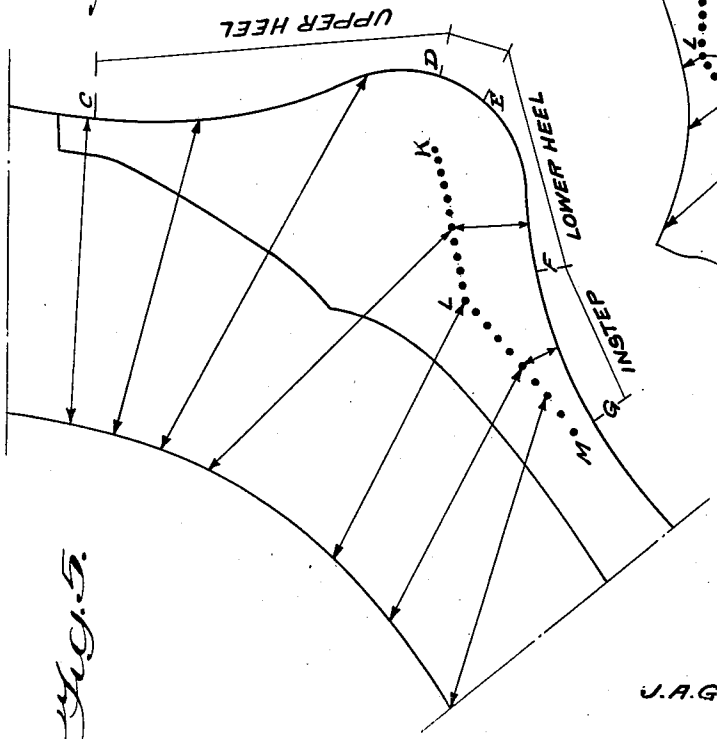


Fig. 5.

Inventor
J. A. GOODMAN,

By Edmund H. Parry Jr.
Attorney

Jan. 25, 1944. J. A. GOODMAN 2,340,266

FULL FASHIONED STOCKING AND METHOD OF PRODUCING SAME

Filed May 24, 1940 5 Sheets-Sheet 4

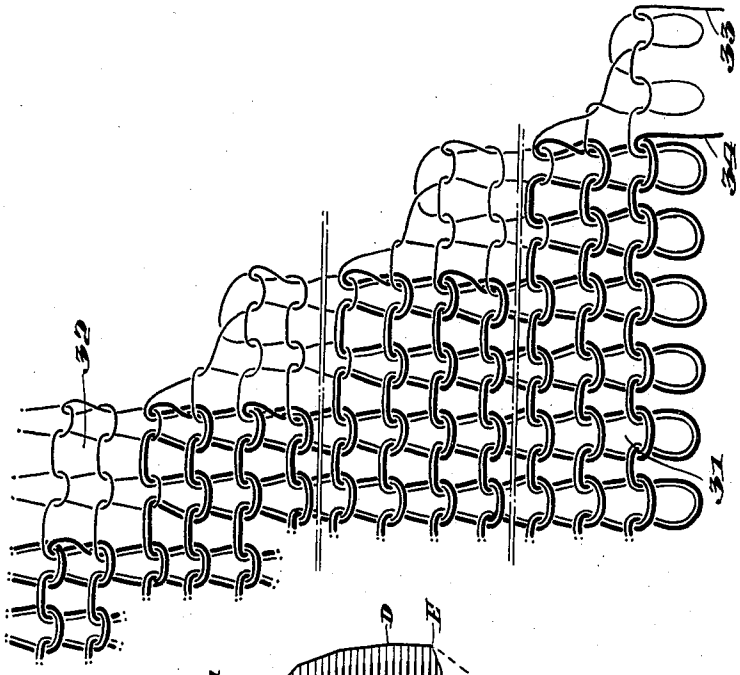


Fig. 10.

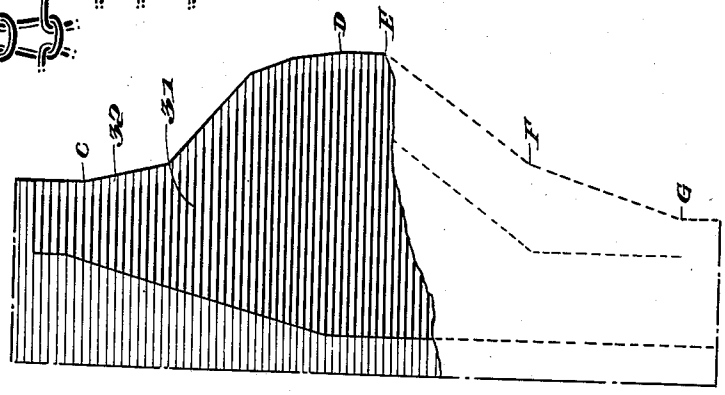


Fig. 9.

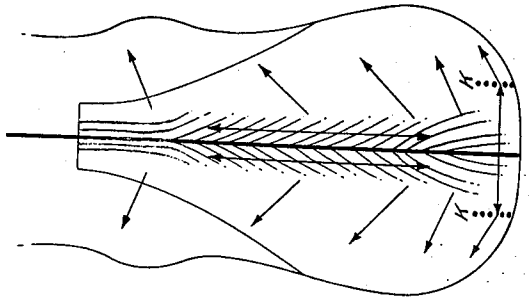


Fig. 8.

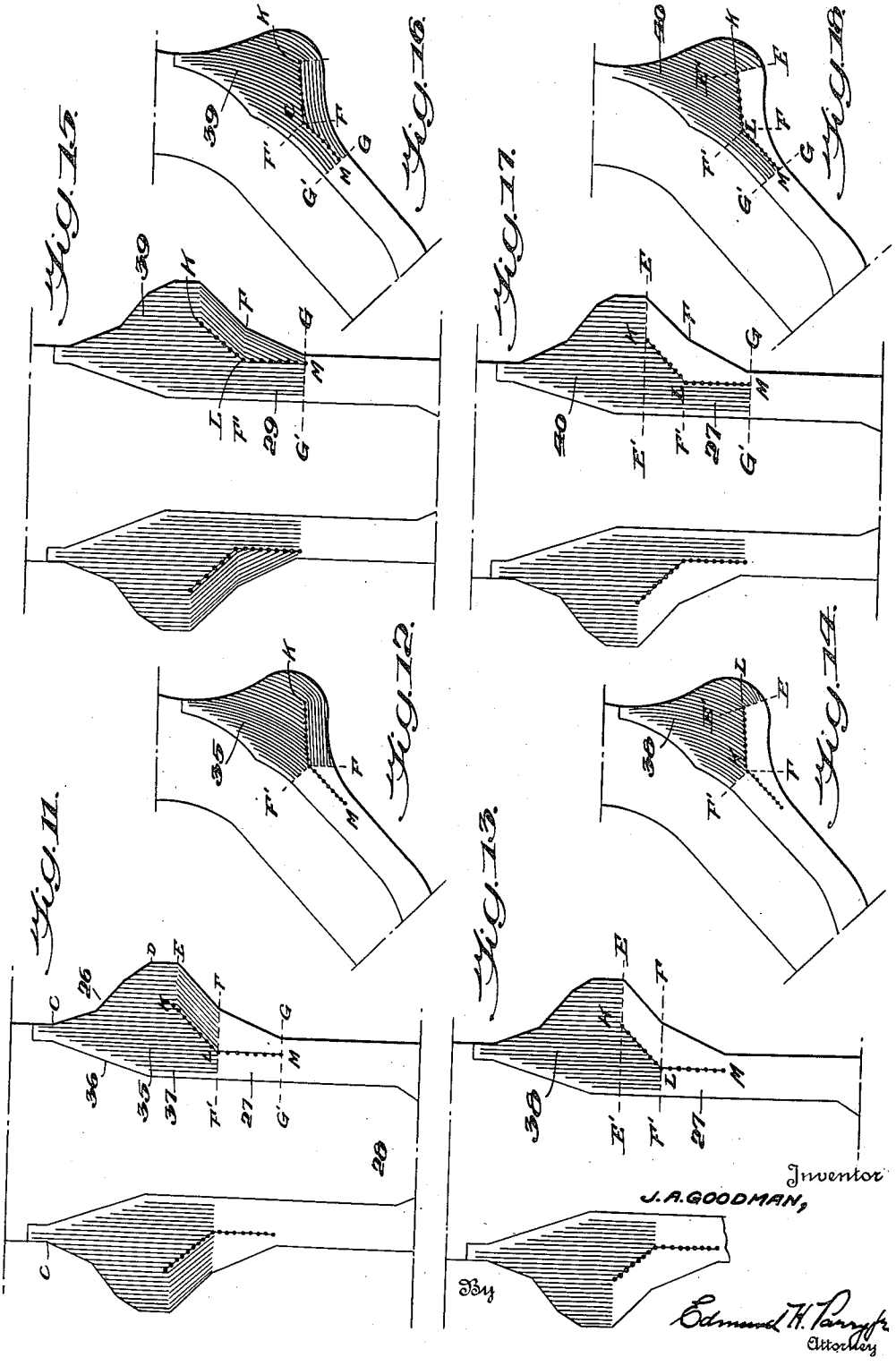
Inventor
J. A. GOODMAN,

By Edmund H. Parry Jr
Attorney

Jan. 25, 1944. J. A. GOODMAN 2,340,266

FULL FASHIONED STOCKING AND METHOD OF PRODUCING SAME

Filed May 24, 1940 5 Sheets-Sheet 5



Patented Jan. 25, 1944

2,340,266

UNITED STATES PATENT OFFICE

2,340,266

FULL FASHIONED STOCKING AND METHOD OF PRODUCING SAME

Jacob A. Goodman, Indianapolis, Ind., assignor to National Hosiery Mills, Inc., a corporation of Indiana

Application May 24, 1940, Serial No. 337,098

29 Claims. (Cl. 66—182)

This invention relates to full fashioned stockings, and has particular reference to improving the fashioning thereof so that the same will correctly fit in the heel and adjoining areas.

As one object of the invention, it is proposed to so construct a full fashioned stocking knit in a flat blank that it will have a correct shape through the employment of certain fashioning operations particularly suited to accomplish this end.

A further object of the invention is to provide a full fashioned stocking which is not only shaped correctly but in which special features are employed to control and adjust the extent and degree of fabric stretch in the heel and adjoining stocking areas so that the stocking may conform smoothly to the human ankle, instep and heel.

The shaping of the stocking through fashioning is accomplished in such a manner that the natural elasticity of the knitted fabric is suitably directed in relation to the changing contour and diameter of the human foot. A heel pocket is formed which is stretchable both vertically and transversely so that the same will adjust itself to the shape of the human heel. The fabric across the high instep arch and adjoining areas will be relieved of undue stretch and concentration of strain at local points therein, and the texture of the fabric will be substantially uniform throughout. At certain fabric areas the stretch is adjusted so as to be less and/or in a different direction than in adjoining areas for reasons to be explained.

A further important object of the invention is to provide a single-unit stocking which will fit correctly in the heel and adjoining areas, and overcome the objections to this type of stocking heretofore existing. According to the invention, a stocking may be formed with the leg, foot and heel areas in one blank on a single machine with continuous selvage edges extending from top to toe, which may be secured in an uninterrupted seam. Because of novel features of fashioning, the completed stocking will be so shaped as to correctly fit the foot.

In single unit stockings heretofore proposed wherein the heel was formed by adding fabric at the sides of the stocking blank, the heel pocket in the finished article has not been of suitable size and shape, and due to the technique employed in forming the heel the knitted fabric in such area lacked elasticity. The heel pocket could therefore not accommodate itself to the shape of the ball of the heel, and because of inadequate size and lack of elasticity of the pocket objectionable strain was imposed across the instep arch. Also, for substantially the same reasons the heel pocket tended to slide lengthwise of the natural heel. According to the present invention the heel pocket is so formed as to nave proper size, shape and elasticity, and as one particular feature of the invention, special provision is made to anchor the heel pocket in position. In particular, it is proposed to so construct the stocking in the instep area forward of the heel pocket that the circumferential stretch in such area will be less than in the heel pocket area, with the result that while the heel pocket is free to adjust itself to the shape of the natural heel, the fabric beneath the instep arch and around the corresponding upper portion of the arch of small diameter will cling to the foot and prevent the heel pocket from sliding rearwardly and upwardly.

Anchorage at the instep through lessening of the stretchability of the fabric in this area as compared with the heel fabric is accomplished in two novel ways. First, the instep fabric is fashioned in a novel manner hereafter explained. Second the sole fabric beginning at a point forwardly of the heel, at or about the smallest portion of the instep arch, and continuing, if desired, forwardly to the stocking toe, is knit with a tighter stitch than the heel fabric. While both of these features serve to reduce the circumferential stretch around the forward part of the instep as compared with the line around the heel and the high instep arch, their effects are additive. Therefore, while it is possible to secure satisfactory results by using one or the other of the features alone, it is found that best results are secured by utilizing the two features together in the same stocking.

It is also desirable to so form the heel pocket as to resist the tendency to slide downwardly around the heel. As a further feature of the invention the back of the heel between the ankle and the wide heel portion is so formed that anchorage is provided in this area which resists to a large degree the tendency of the heel fabric sliding downwardly and forwardly.

Two different methods of fashioning are possible to shape a knitted stocking blank. The transfer method is commonly employed, according to which groups of marginal loops at the sides of the blank at selected courses are shifted laterally, either inwardly or outwardly according to whether narrowing or widening is desired. By reason of the fact that the knitted loops are

stretched through the transfer operation, the fabric is tighter along the transfer areas, and the tightness of the fabric is greater where there is an outward transfer for widening than where the transfer is inwardly for narrowing. For the latter reason there are serious practical objections and limitations to the use of a transfer method for widening. It has been found impractical to widen by transfer more than to the extent of one loop at one edge of any course, whereas in many cases it is important to be able to add two loops per course at one edge of the stocking blank in order that the blank may be widened rapidly and to the extent necessary to insure proper shaping. Even where in widening the transfer is effected by only one loop at a time, the fabric is extremely tight across the back of the heel, and, besides consequently resulting in undue stretching and straining of the fabric area across the front of the instep, creates strain and frequent rupture in the heel area, particularly in the region of the seam, under the walewise tension imparted by the garter pull at the top of the stocking and by the bending of the foot in walking.

It is to be further pointed out that the transfer method results in an inclination of the marginal portions of the courses which are transferred relative to other portions of the courses, as will be evident from the fact that the wales in the transferred areas always run parallel to the marginal edge and meet the wales in the untransferred areas at an angle along a line of transfer marks at the inner boundary of the transferred marginal portions. Hence, the direction of stretch, as well as the extent of stretch, will be different in the transferred portions than in the areas of the fabric inwardly thereof. For some purposes, as below pointed out, advantage may be taken of this fact, whereas it is found that for purposes of widening, particularly in the upper portion of the stocking heel, it is disadvantageous. Also, in the case of widening, the row of transfer marks takes the form of a line of openings which are not only unsightly but constitute strain points at which ruptures of the fabric are likely to occur.

Fashioning by adding edge loops to widen, also by dropping edge loops to narrow, may or may not tighten the texture of the knitted fabric along the edge, all depending on how the knitting is carried out in forming and securing against running the knitted loops along the edge.

Such method of fashioning does not change the direction of the courses and wales along the margins of the stocking blank. The courses and wales will have an inclination to the edges along the widened area. The direction of maximum stretch of the fabric in relation to the fabric edge may therefore be controlled and varied according to whether the widening is such as to cause the edge to extend at a sharp angle or at a gradual angle to the knitted wales. The greater the number of loops added at the edge of the stocking blank per course, and/or the greater the course frequency of widening, the greater will be the inclination of the edges of the widened fabric to the wales thereof.

There are, however, practical problems in the way of widening without loop transfer. Some methods require complicated knitting machine equipment, and where this is not the case, the known methods heretofore proposed are limited to widening by the addition of a single loop at one edge per course, or fail to produce a locked selvage edge such as is necessary to facilitate seaming and prevent runs in the widened areas. Even where complicated knitting machine equipment is employed to widen by more than one loop at a time and produce a selvage edge, the manner of locking the marginal knitted loops, either with or without the employment of tuck stitches, is such that, as in the case of widening with loop transfer, the fabric texture is rendered tight and relatively inelastic along the edge. However, a process of widening without loop transfer which permits adding one, two, or more edge loops, with the production of an elastic selvage edge area, and which may be carried out on a conventional legger type full fashioned hosiery machine, has recently been developed, which I find entirely suitable for widening the heel fabric in a full fashioned stocking, such development being described and claimed in Benjamin F. Somers Patent No. 2,230,986, granted February 4, 1941.

So far as I am aware, no practical process of narrowing merely by dropping loops has been developed which will produce a selvage edge along the narrowed fabric area, and while it is conceivable that such a procedure, if developed, might be employed in a stocking together with various features of fashioning hereinafter specifically explained, I find that narrowing by loop transfer, because it can affect, and be employed to vary, the direction of stretch and the extent f stretch in the narrowed areas of the stocking, is well suited to present purposes. As in the case of the widening, the character of narrowing may be changed at different intervals to produce certain desired effects.

By utilizing and varying the fashioning with due regard to the effects thereof in a stocking, with reference to shape and also elasticity, I have succeeded in developing a stocking wherein the heel portion and adjoining portions are correctly shaped, and wherein the elasticity of the fabric is so correlated with the shape that the stocking fits correctly without concentration of strain in limited fabric areas such as is usually encountered in known stockings, as, for example, across the top of the instep arch and at the sides of the heel wherein the wales are unduly stretched and spread apart.

While certain individual features forming a part of the invention are of general utility in full fashioned stocking manufacture, the main aim of the invention is to provide a correctly fitting single unit stocking wherein the heel is formed in one unit with the foot and leg portions. This is accomplished during the course of knitting the stocking blank by widening in a novel manner the fabric at the upper, or back, heel area above the point of maximum width, measured from the apex of the heel around the high front portion of the instep arch, followed by the narrowing of the fabric in a novel manner to form the underside of the heel, and preferably with further novel narrowing beyond the bottom of the heel in the instep area of reduced diameter.

The following are the principal characterizing features of a full fashioned single unit stocking in accordance with the invention:

1. The ankle portion above the heel is made narrower than customary to properly conform to the small diameter of the leg in this portion.

2. Different types of fashioning are employed for widening and narrowing in the heel area, providing a rounded shape without abrupt corners, and providing selvage edges which are continuous with the selvage edges of the foot and leg.

3. Widening of the heel is accomplished without loop transfer by the addition of marginal edge loops, preferably two at a time, and the fashioning is graduated by varying the course frequency of widening so that the edges along the back heel portions have a concave shape.

4. The widened fabric at the back of the heel, at and inwardly of the selvage edges, is elastic not only coursewise but lengthwise of the rear seam which has a general direction at a bias to the courses and wales. Further, the direction of the knitted wales is adjusted so that the fabric will stretch in suitable directions in relation to the changing surface contour and diameter around the upper portion of the instep and the back of the heel.

5. The narrowing at the underside of the heel is accomplished by loop transfer, preferably by two loops at a time, and the fabric is highly elastic crosswise of the bottom of the heel, so that the stocking heel will more readily conform to the shape of the human heel and the bottom heel fabric relieve the adjoining areas around the wide portion of the instep of undue strain.

6. The instep fabric forwardly of the heel is also narrowed by the loop transfer method, preferably to approximately the highest point of the instep arch beneath the foot. By changing the number of loops transferred in progressive courses of the instep so that the lines of fashioning marks extend at an inclination to the bottom seam, the instep fabric will be rendered less stretchable transversely than the fabric beneath the heel. Preferably, the lines of fashioning in the instep will taper in a forward direction towards the seam as it is found that with such an arrangement the elasticity beneath the instep arch of the foot will gradually decrease in a forward direction so as to be at a minimum in the vicinity of the highest point of the sole arch.

7. The sole fabric forward of the heel is knit with a tighter stitch than the heel fabric. In some cases the tighter knit fabric will be commenced at the completion of the instep narrowing. In other instances the tighter fabric will be commenced just forwardly of the heel at the beginning of the sole instep arch. This latter arrangement is particularly desirable where the instep fashioning is not tapered inwardly as above explained.

8. The heel and foot sole fabric will both be reinforced, but preferably the heel will be formed with more heavily reinforced fabric than the foot sole. Since the heel fabric should be readily stretchable in any event to conform to the shaping of the human heel it must be knit with a looser stitch than the foot sole fabric, where tightness is desired, and the relative stretchability of the heel and sole will be maintained where the respective areas comprise reinforced fabric of different weight. Because the stretchability of knitted fabric normally tends to decrease as the extent of reinforcement thereof increases, when heavy reinforced fabric is employed in the heel it will be knit with a comparatively loose stitch while the sole fabric will be knit with a relatively tight stitch, and accordingly the heavier reinforced fabric of the heel will have a greater degree of elasticity than the lighter reinforced fabric of the foot sole at and/or forwardly of the foot sole arch.

The above and other features of the invention will be understood by reference to a description of preferred embodiments thereof illustrated in the accompanying drawings wherein:

Fig. 1 is a diagrammatic view of a flat full fashioned stocking blank embodying the various features of the invention and made as a single unit.

Fig. 2^a is an enlarged diagrammatic view of one side of the heel section as shown in Fig. 1, and Figs. 2^b and 2^c are similar views showing several modifications.

Fig. 3 is a diagrammatic view of the knitted fabric in the upper heel portion with the addition of two loops at course intervals along the edges according to a preferred method of widening.

Fig. 4 is a diagrammatic view of the knitted fabric with narrowing by transfer of two loops at a time in selected courses along marginal areas as employed in the lower heel and instep areas.

Fig. 5 is a diagrammatic side view of the heel and adjoining areas of the completed stocking made from a fashioned blank as in Fig. 1, arrows being shown therein to show the direction of maximum stretch at different points.

Fig. 6 is a perspective view showing the same area of the stocking when on the foot.

Fig. 7 is a bottom plan view showing the underside of the heel and instep, arrows being applied to indicate the direction of maximum stretch at different points, and Fig. 8 is a similar view looking from the back of the heel.

Fig. 9 is a view corresponding to Fig. 2^a and illustrating one preferred arrangement for reinforcing the heel fabric, and Fig. 10 is a diagrammatic view of the knitted fabric, as in Fig. 3, in the widened area of the heel with reinforcing according to Fig. 9.

Figs. 11 and 12 are views in the flat blank and from the side after completion, respectively, of a fashioned heel as in Fig. 1 showing one preferred arrangement for reinforcing the heel, and Figs. 13 and 14, 15 and 16, 17 and 18 are similar views showing modified arrangements for reinforcing.

The illustrative stocking shown in Fig. 1 and representing a preferred embodiment of the invention is formed as a flat blank to include a top portion **20**, leg portion **22**, and calf portion **23**. The calf fashionings **24** which begin at A—A are carried down to B—B to provide between B—B and C—C an ankle portion **25** which is sufficiently narrow to fit the relatively small diameter of the human ankle.

In conventional full fashioned stockings the ankle portion is ordinarily made unduly large in diameter in order to obtain a blank of adequate width around the area of large diameter across the apex of the heel and the high instep arch. Because of the manner of forming the heel according to the present invention the ankle portion **25** may be made as narrow as desired, by regulating the number and course frequency of narrowing fashionings **24** in the calf, and still obtain adequate width across the heel and instep.

The fashioning of the heel sections **26** begins at C—C and consists in widening the blank through a series of widenings W down to D—D, and after knitting a series of courses between D—D and E—E without fashioning, the heel is completed by a series of narrowings from E—E to F—F, thus forming the bottom heel portions. Where the heel sections are of a high splice type, the beginning fashioning line C—C will ordinarily be located a short distance below the upper

extremity of the high splice. The fashioning is continued into the instep 27 by further narrowings between F—F to G—G. Thereafter the foot portion 28 is knit, including a toe 29 fashioned either by single narrowings or, as shown, by double narrowings 30.

The heel sections 26 are widened without transfer of loops for reasons previously explained, merely through the addition of edge loops at recurrent courses. The method of widening should be such as not only to produce a selvage edge but to render the fabric more or less elastic lengthwise of the edge and in a transverse direction. One form of widening stitch which I have found produces elastic edges suitable for present purposes is illustrated in Fig. 3, the same being accomplished by widening in selected courses at opposite edges of the stocking blank through lengthening the traverse of the yarn carrier on a flat knitting machine during the laying of selected courses before the needles have descended by the extent of preferably two needles. Such method of widening may be carried out on conventional full fashioned legger machines operating under both the single carrier and ringless three carrier systems, as more fully pointed out and claimed in the aforesaid Somers Patent No. 2,230,986. Regular forms of sinkers, dividers and knockover bits may be employed. The use of hooked knockover bits should be avoided.

Inasmuch as the human heel at the back is concave adjacent the ankle and convex adjacent the heel apex, the formation of the heel sections between C and D is graduated. The course frequency of fashionings is varied as knitting progresses not only so as to accomplish this end, but to gradually change the angular relation between the edges and the direction of wales so that the direction of stretch in the widened part of the heel will be changed to conform to changes in shape and diameter of the human foot.

The total number of wales added in the widening operation between C and D will in part depend on the width of the ankle. The narrower the ankle the greater the number of widening operations necessary to obtain adequate width of the stocking blank in the area between D—D and E—E in Fig. 1. For example, between thirty-six and fifty wales may be desirably added in the heel at each side, and this will necessitate from eighteen to twenty-five widening steps if two loops are added at each step. About forty or forty-two wales give very good results.

As just pointed out, the course frequency of widening desirably is varied. The first area of widening will begin at the upper part of the heel section, where the back of the ankle starts to curve outwardly, near the upper end of the usual high splice. This area will be followed by a second area with more abrupt widening, and preferably before the apex is reached there will be a third area with gradual widening which may be more gradual than the first widening. In explanation of these points, reference is made to Fig. 2a. The first gradual widening is carried out between C and H, which produces a slight inclination of the edge. The widening W' may consist, for example, of six widening steps at five course intervals, each adding two edge loops at each edge. Between H and I the widening is more abrupt because of the rapidly increasing diameter of the foot in a downward direction due to the rearward flare of the heel and the height of the instep arch. The fashioning in area W^2 may consist, for example, of nine widening steps with the addition of two edge loops at each edge at intervals of three courses.

To avoid a sharp corner at D such as might occur if the abrupt widening would carry to such point, it is desirable to add further widenings at less frequent intervals than in areas W^2 and W^1 so that the edge between I and D will be less inclined than between H and I and between C and H. It may be found sufficient to add one widening at J and a second one at D in the area W^3 at intervals of ten courses, each widening adding two loops at each edge.

After the point D is reached an apex area X of straight courses is knit down to E, say about twenty-seven courses, and thereafter the stocking blank is reduced in width at each side to form the bottom of the heel. Narrowing between E and F in area N' is accomplished through loop transfer, preferably by two loops at a time in selected courses.

As far as shaping is concerned, it is immaterial whether the loop transfer operation be carried out in a narrow or wide group of loops along the underedge of the heel between E and F. It has been found, however, that if the loop transfer be carried out only in a narrow marginal area, the resulting heel is unduly tight and the fabric across the instep arch is strained and unsightly in appearance. This difficulty is overcome by carrying out the heel narrowing in wide marginal areas between thirty and forty wales wide, and preferably about thirty-five wales. The fashioning line KL will be located outwardly from the edge seam in the completed stocking so as to be positioned near the side margins of the bottom of the human heel. The fabric courses in the fashioned area run at right angles to the edge seam, and by thus making the area wide the major bottom area of the stocking heel will be highly stretchable crosswise of the bottom of the heel. The manner of narrowing by transfer of marginal loops in selected courses to an extent of two loops inwardly is illustrated in Fig. 4 and need not be described in detail since it is well known to those skilled in the art.

As shown in Fig. 2a, the narrowing in area N' of the heel is carried out by transferring inwardly the same large number of marginal loops in each of a series of selected courses so that the line of fashioning marks between points K and L will extend parallel to the edge E, parallel to the wales therein, and meet the wales inwardly of the fashioned area at an angle. Preferably, there will be about fourteen narrowing steps in area N', each narrowing the stocking blank by two wales. The narrowing steps may occur at equal intervals of about four courses, or if desired the course frequency of narrowing may be graduated as in the case of widening in the upper portion of the heel.

The heel should not be narrowed too abruptly because of the considerable circumference around the foot on a line passing around the underside of the heel and across the instep arch. At the same time, because of the concave shape of the foot beneath the instep arch just forwardly of the heel, the stocking blank must be narrowed sufficiently to properly fit at the latter area and provide a foot portion which is sufficiently small in diameter. Accordingly, the narrowing of the heel in area N' is limited so as not to make the stocking blank too narrow at F—F in Fig. 1, and the narrowing is carried on into the instep area 27 between F—F and G—G.

As will be seen in Fig. 2a, the fashioning in

the instep area N^2 is not the same as in the bottom heel area N'. The instep narrowing is so arranged that there will be less elasticity crosswise beneath the instep than crosswise at the bottom of the heel rearwardly thereof so that the stocking will fit tightly beneath the underside of the instep arch and around the corresponding top portion of the arch and exercise a binding action which will prevent the relatively elastic heel from sliding rearwardly of the foot.

This end is attained by narrowing along the instep sole area at each side of the blank by the loop transfer method. The number of loops is progressively changed so that the fashioned areas in the instep are defined by fashioning lines which are inclined to the bottom seam joining the edges of the fabric. It is preferable that the fashioned instep areas should progressively diminish in width in a forward direction so as to be narrower at their forward end than at their rear end, and in such case the rear portion of the instep fashioned areas may be so proportioned that the fashioning lines defining the same meet the forward ends of the fashioning lines which define the fashioned heel areas. Thus, as shown in Fig. 2^a the line of instep fashioning marks LM forms an angular continuation of the heel fashioning line KL, but whereas line KL throughout its length is widely spaced from, and preferably parallel to, edge FG, instep fashioning line LM tapers in a forward direction towards edge FG. Through this arrangement the line of fashioning marks LM, defining the boundary between the instep fashioned area and the fabric area inwardly thereof extends at a bias across the wales in the fashioned area, thereby graduating and restricting the stretch between transverse lines LF and MG and rendering the fabric in such area less elastic than in the heel area between transverse lines KE and LF. A further important effect is obtained by the tapering arrangement of the instep fashioning lines in that the fabric inwardly of the instep fashioning lines has the wales inclined to the fabric edges so that the coursewise direction of maximum stretch therein is inclined rearwardly and enables such fabric to stretch cooperatively with the heel, all as will be more fully understood by reference to Figs. 5, 6 and 7. It is found in actual practice that the inclined arrangement of the fashioning lines in the instep area provides a marked difference in degree of elasticity in the underside of the instep, particularly at the forward portion thereof, as compared with the heel, and that whereas the heel pocket is relatively elastic so as to be adapted to conform itself to the shape of the natural heel, the instep fabric fits tightly with a binding action around the instep sole arch. The elasticity of the fabric in a direction cross-wise of the seam will be at a maximum in the region of the heel and the rear of the instep arch where the opposing fashioning lines are spaced most widely, and such cross-wise elasticity will decrease gradually beneath the instep, as the fashioning lines converge forwardly towards the seam to a minimum in the region of the forward ends of the fashioning lines. This will be understood by reference to Figs. 5 to 7 hereafter to be discussed.

The course frequency of narrowing in the instep area N^2 in Fig. 2^a is less than in the heel narrowing area N' and edge FG therefore inclines to a lesser degree than the bottom edge EF of the heel. Such instep fashioning may consist of ten narrowings at intervals of six courses. However, in some cases the course frequency of narrowing in the instep may be the same as or greater than in the heel. In general the course frequency of narrowing in the instep will depend on the weight and inherent stretchability of the fabric employed, and these latter factors will also be taken into account in determining the relative proportions of the heel and instep fashioning areas. It will be understood, of course, that the course frequency of narrowing is not an important factor in effecting tapering of the instep marginal fashioning areas above referred to, since the latter arrangement is dependent primarily upon variation in the number of loops transferred in the fashioned courses regardless of the frequency of the courses.

After the completion of the fashioned instep 27, the knitting of the main portion of the foot 28 may be continued from line E—E as shown in Fig. 1, and a fashioned toe 29 then formed to complete the stocking blank. Because there is a continuous selvage edge around the heel a single seam may be employed from top to toe of the stocking.

In lieu of or in addition to fashioning the instep along tapering lines as previously explained, it is frequently found desirable to knit portions of the foot sole forwardly of the heel with a tighter stitch than employed in the heel so that such sole fabric will have lesser elasticity than the heel fabric, and this regardless of whether the heel fabric is or is not more heavily reinforced than the sole fabric forwardly thereof. In Fig. 2^a I have diagrammatically illustrated the employment of tighter knit fabric in an area T beginning at transverse line MG at the forward end of the instep fashioning. With such an arrangement the more tightly knit fabric will begin at a point beneath the sole instep arch where the foot is of relatively small diameter, and as indicated in Fig. 1 the more tightly knit fabric area T may continue forwardly to the toe. In some cases it may be preferable to knit the fabric with a tighter stitch starting farther back, say at the beginning of the instep as represented by line LF in Fig. 2^a. In such case, however, care will have to be taken not to knit the sole fabric with too tight a stitch in the area between lines LF and MG as otherwise difficulty may be experienced in the fashioning of the instep fabric due to the fact that it is more difficult to transfer loops in tightly knit courses than in loosely knit courses.

It should be mentioned that the lengthwise dimension of the widened back area of the heel must be so proportioned that the heel area DE of maximum width will come at the apex of the human heel. Also, the lengthwise dimension together with the angle of narrowing along the lower part of the heel should be so correlated to the length and inclination of the heel back and the length of the apex area that a heel pocket of correct size and shape will be provided, in Fig. 2^a, the widened back area CD is shown longer than the narrowed heel bottom EF, but of substantially the same length as the combined narrowed areas of the heel and instep between E and G. Slightly more wales are taken out in narrowing than are added in widening so that the foot is slightly narrower than the ankle. However, the total length of the widened area and the number of wales added therein, and the length of the narrowed area of the heel and instep and the number of wales eliminated therein are capable of considerable variation, and will depend on the

width of the stocking at the instep and the weight of the fabric employed.

In Fig. 2[b] is shown a heel fashioned in the same shape as in Fig. 2[a], but wherein a double narrowing by loop transfer is effected through a narrowing operation similar to that employed in forming a diamond toe in conventional full fashioned stockings. In such view the narrowing at the under heel area N' is carried out in a wide area as before, defined at its inner boundary by fashioning line KL, but between line KL and edge EF is a further line of fashioning marks K'L'. Between the latter line and edge EF the loops at selected courses are transferred inwardly to an extent of two loops, whereas between fashioning lines K'L' and KL the loops are transferred inwardly to the extent of only a single loop. The knitted wales in the latter area therefore extend angularly to the wales outwardly of line K'L', which run parallel to edge EF, and also angularly to the wales inwardly of line KL. This double narrowing in the heel prevents as abrupt change in the direction of maximum stretch so that there is less strain along fashioning line KL in the present embodiment than in the case of a single fashioned area as in Fig. 2[a]. While in the embodiment shown the instep along the edge FG is fashioned by a single narrowing area defined by fashioning line LM, it will be understood that a double narrowing arrangement may be employed therein as well as in the heel.

A further modification in the narrowing fashioning is shown in Fig. 2[c]. As previously explained, the heel fashioning should be carried out in a relatively wide area along the edge and the instep narrowing should be carried out in a relatively narrow area. Whereas in the previous embodiments the line of fashioning marks KL were directed parallel to edge EF and at an angle to the line of fashioning marks LM in the instep, in the present embodiment the line of fashioning marks NO in the heel and OP in the instep form a single straight line, which is widely spaced from the edge of the heel at E and gradually converges towards the edge throughout its length so as to be substantially more closely spaced to the edge of the blank at G.

When the stocking is completed by seaming the opposite edges together, the same will be shaped approximately as shown in Fig. 5 when laid flat. The back, or upper, part of the heel between C and D will curve gradually rearwardly in an outward direction and then bend inwardly as it approaches D. Because of the wales added in the widening operation, the stocking will have adequate width in the apex area in the region of D and E so that there is an adequate width of fabric across the widest portion of the heel and the high instep arch. The fashioning in the lower heel and instep causes the stocking to cup properly under the bottom of the heel and fit the smaller circumference of the foot at, and forwardly of, the instep area below the high part of the arch. The arrows in Fig. 5 indicate the approximate directions of maximum fabric stretch of the stocking fabric resulting from fashioning through widening and narrowing as herein explained. This may be further understood from Fig. 6 which shows the direction of wales of the stocking when on the foot, and from Figs. 7 and 8 which show the underside of the heel and instep, and the back of the heel.

As will be seen from Fig. 5, the direction of maximum stretch from the rear edge assumes a more upward inclination in a forwardly direction progressively from the upper part of the heel down to the front of the instep. As the upper heel widens out, the direction of stretch is at an increasing angle to the rear seam, due to widening by the addition of end loops at different course intervals at the several areas along the back. In the fashioned area at the bottom of the heel the direction of stretch is transversely because of the narrowing by loop transfer, so that this area is able to stretch to fit the heel and relieve the fabric across the high instep arch and at the sides of the heel of undue strain. The direction of stretch in the instep fashioned area is also transversely. By reason of the tapering of the instep fashioning lines the stretch in a transverse direction at right angles to the sole seam decreases gradually in a forward direction. At the same time the wales in the unfashioned area bordering the tapering fashioning lines LM taper towards the seam so that the coursewise direction of stretch is in an inclined direction towards the low forward part of the top instep arch, as will be understood from the arrows in Figs. 5 and 7. With such an arrangement, when the stocking is worn, strains which might otherwise be transmitted to the high rear portion of the instep arch are referred forwardly and may be absorbed in the fabric in the circumferential area of smaller diameter across the lower portion of the instep arch. It will be understood from Fig. 8 that whereas the direction of maximum stretch at the rear of the heel inclines forwardly and upwardly, the fabric is also stretchable lengthwise of the seam, which runs at a bias to the wales and courses of the widened fabric, so that the stocking heel will accommodate itself to the contour of heels of varying shape without creating undue stress across the instep arch. The elasticity at the back of the heel is demonstrated by the fact that when on the foot the fabric may be readily pulled away from the heel, and does not fit tightly in this area as is characteristically true of prior single unit stockings and many stockings made on legger and footer machines. The vertical component of elasticity at the back and bottom of the heel is extremely important in preventing undue tension when the foot is bent and under the vertical pull created by garter fastenings, so as to prevent rupture of the fabric in these areas, and the elasticity of the selvage edges in the widened fabric at the back of the heel is also important for the same reason.

As indicated in outline in Fig. 1, the heel portions **26**, the sole portions of the foot **28**, and the toe **29** will incorporate heavier fabric than employed in the leg. This is accomplished by knitting one or more reinforcing, or splicing, yarns simultaneously with the main body yarn. As above pointed out, it is desirable that in the widened portions of the heel, wherein the knitted wales and courses run angularly to the selvage edge between C and D, see Fig. 2[a], the edges and the adjoining marginal areas of the fabric should be elastic. To insure the desired elasticity, it may be found desirable in many cases to knit the marginal areas along the selvage edges in the widened heel area with less than the total number of yarns employed in the fabric inwardly of the margins so that the marginal knitted loops will be looser and capable of a greater degree of stretch than where the body yarn and the reinforcing yarn all extend to the edge. Such an arrangement is illustrated in Figs. 9 and 10. Fig. 9 is lined to indicate courses. The main heel

body comprises reinforced fabric 31 which is bordered by a marginal area 32 of lighter and looser fabric along the widened edge. This may be accomplished in the manner shown in Fig. 10 which illustrates a widened fabric area of the heel according to Fig. 3. The reinforced heel fabric 31 is shown as comprising a plurality of yarns 33 and 34. One of such yarns, 34, is terminated a predetermined distance inwardly from the edge so that the marginal area 32 is formed of loops comprising only yarn 35. In Fig. 10 yarn 34 terminates two loops inwardly from the edge, but it will be understood that the showing is merely illustrative and that yarn 34 may be stopped farther inwardly so as to leave three, four, or more loops composing a light fabric margin along the widened selvage edge. Assuming that the reinforced heel is knit of a body yarn and a single splicing yarn, either the reinforcing yarn may be stopped inwardly of the edge and the body yarn employed alone to form the marginal area 32, or the body yarn may be stopped inwardly of the edge and the reinforcing yarn employed in the marginal area. As will be hereafter pointed out, it may be desirable to make the heel fabric heavier than reinforced sole portions of the foot, and for such purpose a plurality of reinforcing yarns may be employed in the heel. In such event any one or more of the group comprising the body yarn and the several splicing yarns may be stopped inwardly of the edge so as to give a lighter fabric area along the margin, and it will be understood that I do not limit myself to the use of any particular yarn or yarns in knitting the lighter marginal area. Referring again to Fig. 10, it will be observed that as the fabric is widened by the addition of edge loops, the width of the reinforced fabric is correspondingly increased.

In knitting the sole portions of the foot 28 it is desirable to add only a single splicing yarn so that the fabric in this area will be moderately light weight, although heavier than that across the top of the foot. In knitting a single unit stocking such a splicing yarn will be ordinarily introduced on each side of the blank at the top of the heel sections 26 and continue down through the entire heel, instep sections 27, and sole portions of the foot 28. Because of the heavy wear at the heel, the resulting fabric will in many cases not be found sufficiently durable for the heel. Accordingly, it is proposed to utilize heavier fabric in the heel of the present single unit stocking than in the foot sole, terminating the heavy reinforcement at a suitable point and continuing in the foot sole only with the lighter reinforced fabric. If desirable, one or more heavy reinforcing yarns may be employed, either with, or substituted for, the main body yarn in the heel, and thereafter a lighter splicing yarn employed preferably with the body yarn, in forming the foot sole. It will be found most convenient, however, to knit a splicing yarn with the body yarn throughout the heel and sole and use a further reinforcing yarn in addition to the splicing yarn and the body yarn in the heel area.

One such arrangement is illustrated in Figs. 11 and 12. Therein the reinforced fabric 35 is terminated at the front boundary of the heel, represented by the line F—F' in both the fashioned area and adjoining area so that the instep portion 27 between lines F—F' and G—G' comprises the same lighter fabric as the sole portions of the foot. Preferably, the heavy reinforcing yarn will terminate in spaced relation to the inner boundary 36 of the heel since a better appearance will be secured along the boundary line than if the extra reinforced yarn and the splicing yarn terminate at a common boundary. The inner boundary 37 of the reinforcing yarn normally will be spaced three or more loops away from the splicing yarn boundary 36.

In the embodiment of Figs. 13 and 14 the reinforced fabric 38 is carried downwardly to line E—E', and is thereafter continued to the front line F—F' of the heel only inwardly of the fashioning line KL so that the marginal fashioned area is of lighter fabric. Hence, the fashioned area will be more stretchable, as well as having a different direction of maximum stretch, than the adjoining fabric inwardly of line KL.

In Figs. 15 and 16 the reinforced fabric 39 is continued not only through the fashioned and unfashioned portions of the heel as in the embodiment of Figs. 11 and 12, but is carried on to the front line G—G' of the instep 27.

In the embodiment of Figs. 17 and 18, the reinforced fabric 40 is again carried to the forward line G—G' of the instep 27, but only inwardly of the fashioning line KL in the heel and fashioning line LM in the instep. Hence, the entire fashioned area from line EE down to line G—G' will comprise lighter fabric as well as having a different direction of maximum stretch than the reinforced fabric inwardly of lines KL and LM.

It will, of course, be understood that the heavy reinforced fabric of the heel may be continued somewhat forwardly of line G—G' of the instep to an intermediate point of the foot sole between the toe and the instep. Again, since the main wear is at the back of the heel the reinforcement may be terminated at the line E—E' so that the fashioned and inward areas in the narrowed portion of the heel and in the instep may consist of lighter fabric than the upper portion of the heel. Still further, the arrangement between lines E—E' and F—F' in Figs. 13 and 14 may be reversed so that lighter fabric will be employed inwardly of the heel fashioning line KL and reinforced fabric employed in the fashioned area outwardly of line KL. Similarly, in Figs. 17 and 18 the fashioned area of the heel and instep outwardly of lines KL and LM may comprise reinforced fabric, while the fabric inwardly of such fashioning lines may comprise lighter fabric.

It will be further understood that whereas in all of the embodiments of Figs. 11 through 18 the reinforced heel fabric is shown as extending to the selvage edge in the widened upper portion of the heel, resort may be had to the arrangement shown in Figs. 9 and 10 wherein less than the total number of yarns are employed along the edge to provide a marginal area of lighter fabric.

It will be evident that the various reinforced embodiments of the single unit full fashioned stocking just described will differ from each other with respect to the circumferential stretchability in the areas of the heel and instep. One form may be found more satisfactory than another depending on the shape in which the stocking is fashioned, the width of the fashioned area at the heel, and the width and extent of the fashioned area, where employed, in the instep.

Regardless of whether or not the whole or a portion of the heel and/or the instep are more heavily reinforced than the foot sole, it is found desirable to knit the sole fabric, beginning at a point in the area of the bottom instep arch, with

a tighter stitch than employed in the heel so that the sole fabric in the area of the instep arch will be less elastic than the heel fabric. To accomplish this it will be evident that the knitting machine must be adjusted to form longer loops in the heel than during the knitting of the tighter sole portions. Where, as above proposed, the heel is formed of heavier fabric than the sole, it would ordinarily follow that the heavier heel fabric would be less elastic than the lighter sole fabric. Hence, to secure the desired elasticity in the heel, and a differential between the elasticity in the heel and the elasticity in the sole, that is to secure greater elasticity in the heavy reinforced fabric than in the light reinforced fabric, it is necessary to use a substantially longer stitch during the knitting of the heel than during the knitting of the sole. This may be accomplished through suitable adjustment of the rocker arm of the knitting machine to shift the needle bank rearwardly towards the head a predetermined relatively long distance during the formation of the heel, and a lesser distance during the formation of the sole. In this manner the sinkers will form longer loops in the heel despite the fact that heavier yarn is employed in this area.

I am aware that various arrangements have been proposed for single unit full fashioned stockings in the heel area, but to the best of my knowledge no stocking of this type wherein the heel is formed merely through widening and narrowing of the stocking blank has been proposed which had a heel pocket shaped to correctly fit the human foot. The major complaints against prior single unit stockings have been that the heel pocket was not correctly shaped and/or that the same was too small, and that the stocking across the heel and instep arch was of insufficient diameter. Tests of the stocking according to the present invention indicate that these objects are fully overcome. This is in part due to the fact that the stocking is so fashioned that its shape conforms to the shape of the human foot, and in part also due to the fact that the fashioning is so carried out with due regard to the normal direction of stretch of knitted fabric that regardless of the changing contour and diameter of the foot the stretch of the fabric by reason of the particular manner of fashioning is properly adjusted to conform thereto.

A single unit stocking incorporating the various features herein disclosed may be made on a conventional legger machine.

I claim:

1. A full fashioned flat-knit stocking having fashioned heel sections including upper portions progressively widened by the addition of edge loops and defined by outwardly inclined back edges and progressively narrowed lower portions defined by inwardly inclined lower edges, said back and lower edges being joined in a common seam the widening along one area of the upper heel portions being more abrupt than along an adjoining area of the upper heel portions so that the back edges in the several widened areas incline outwardly at different angles to the wales along the edges, the coursewise direction of stretch of the knitted fabric along the seamed back edges inclining to the seam at different angles in the several widened areas along the back edges.

2. A full fashioned flat-knit stocking having heel sections which at their back are widened by the addition of loops in progressive courses, the back edges being gradually inclined to the knitted fabric wales in the upper back area of the heel and being followed by an area in which the edges are more sharply inclined to the knitted wales.

3. A full fashioned flat-knit stocking having heel sections which are widened in progressive back heel areas in the direction of the bottom of the heel by the addition of edge loops in recurrent courses and defined by back selvage edges which meet the knitted fabric wales along the edges in the progressive back heel areas at different angles.

4. A full fashioned flat-knit stocking having fashioned heel sections with progressive widening at the back of the heel by the addition of edge loops in progressive courses, the widening in the upper part of the heel being gradual, and being followed by an area in which the edges are more sharply inclined and wherein the widening occurs at more frequent intervals.

5. A full fashioned flat-knit stocking having heel sections which at their back are widened by the addition of loops in progressive courses, the back edges being gradually inclined to the knitted fabric wales in the upper back area of the heel and being followed by an area in which the edges are more sharply inclined to the knitted wales, and there being a further back area between said latter area and the point of maximum heel width wherein the edges are gradually inclined.

6. A full fashioned flat-knit stocking having heel sections which at their back are widened in progressive courses down to a straight-knit apex area and which are narrowed in progressive courses below the apex area, the back edges being relatively sharply inclined outwardly for an area of their length at the back of the heel, and there being a further area between said latter area and the straight-knit apex area wherein the back edges are inclined outwardly more gradually.

7. A full fashioned flat-knit stocking having heel sections with widening along the back edges by the addition of edge loops in progressive courses, the widening in the upper area of the heel being gradual, and being followed by an area in which the edges are more sharply inclined and wherein the widening occurs at more frequent intervals, and the second area being followed by a further area adjacent the widest part of the heel wherein the edges are less sharply inclined and the widening occurs at less frequent intervals than in either the first or second areas.

8. A full fashioned flat-knit stocking having heel sections which at their back are widened in progressive courses, the back edges being gradually inclined to the knitted fabric wales in the upper back area of the heel and being followed by an area in which the edges are more sharply inclined to the knitted wales.

9. A full fashioned flat-knit stocking having heel sections which at their back are widened in progressive courses, the back edges being gradually inclined to the knitted fabric wales in the upper back area of the heel and being followed by an area in which the edges are more sharply inclined to the knitted wales, and there being a further back area between said latter area and the point of maximum heel width wherein the edges are gradually inclined.

10. A full fashioned flat-knit stocking including heel sections narrowed along their bottom edges by loop transferred fashioning areas, said fashioning areas including two opposing spaced lines of fashioning marks extending along the

bottom edges and forming adjoining inner and outer fashioning areas in which the knitted wales are angularly related to each other and to the wales of the heel inwardly of the innermost of said fashioning lines.

11. A full fashioned flat-knit stocking including instep sole sections having narrowing areas of transferred loops therein defined by lines of fashioning marks which extend at an angle to the edges of said sections and inclined to the knitted wales of said fashioning areas, said fashioning lines defining binding lines restricting the coursewise stretch in the fashioned areas.

12. A full fashioned flat-knit stocking including fashioned instep sole sections having tapering fashioned areas along their bottom edges bounded by lines of fashioning marks which incline forwardly towards said edges.

13. A full fashioned flat-knit stocking including integral heel and instep sole sections having fashioning areas of transferred loops extending along their edges, the fashioning areas in the instep sole sections being of progressively changing width in a forward direction and being bounded by fashioning lines that incline to the edges.

14. A full fashioned flat-knit stocking including fashioned heel sections having wide fashioned areas of transferred loops extending along their bottom edges which are stretchable crosswise of the foot, and being bounded by lines of fashioning marks widely spaced from the bottom edges throughout their length, and instep sole sections adjacent the heel sections having fashioned areas of transferred loops extending along their bottom edges of progressively diminishing width in a forward direction, and being bounded by lines of fashioning marks inclined to the bottom edges of the sections.

15. A full fashioned flat-knit stocking having integrally knit heel and instep sole sections, lines of narrowing fashioning marks extending along the bottom edges of the heel and instep sole sections, the lines of fashioning marks in the heel sections extending parallel to the bottom edges, and the lines of fashioning marks in the instep sole sections being inclined to the bottom edges and to the lines of fashioning marks in the heel sections.

16. A full fashioned flat-knit stocking formed as a single unit and including fashioned heel and instep sole sections having continuous selvage edges joined in a seam, the back portions of the heel being widened by the addition of end loops along the back edges in progressive courses, the lower portions of the heel sections and the instep sole sections having marginal narrowing fashioning areas of transferred loops defined by lines of fashioning marks extending in spaced relation along the opposite sides of the bottom seam, the fashioning lines in the instep sole sections being inclined to the fashioning lines in the lower heel portions and being also inclined to the knitted wales of the instep fashioning areas.

17. A full fashioned flat-knit stocking as in claim 16 wherein the fashioning lines in the lower heel portions extend parallel, or substantially so, to the bottom seam, and the fashioning lines in the instep sole portions converge forwardly towards the bottom seam.

18. A full fashioned flat-knit stocking including fashioned heel sections widened along their back edges and having narrowing fashioning areas extending along their lower edges, lines of fashioning marks spaced inwardly from the lower edges and forming boundaries between the marginal fashioned areas and the inwardly adjoining heel areas, reinforced fabric in the heel sections, said reinforced fabric in the lower parts of the heel sections being confined to the areas on one side of the fashioning lines and the areas on the other side of the fashioning lines comprising lighter fabric.

19. The method of making a full fashioned stocking blank in a single operation which includes knitting the top, leg and ankle portions, continuing the knitting and forming heel projections with inclined selvage edges by adding end loops at opposite sides of the blank in progressive courses, the upper part of the heel projections being widened at selected course intervals serving to incline the edges at a gradual inclination, and being followed by a second part of the heel projection widened at more frequent course intervals to incline the edges at a sharper inclination, thereafter narrowing the heel projections in their lower portions, and knitting the stocking foot integral with the narrowed lower heel portions.

20. The method of making a full fashioned stocking in a single operation according to claim 19 wherein following the widening in the second part of the heel projections the heel projections are widened in a third part at less frequent course intervals than in the second part.

21. The method of making a full fashioned stocking blank in a single operation which includes knitting the top, leg and ankle portions, continuing the knitting and forming heel projections with inclined selvage edges at opposite sides of the blank by adding end loops in progressive courses, thereafter narrowing the lower portion of the heel projections by the inward transfer at opposite sides of the blank of marginal groups of loops in progressive courses and forming selvage edges in the narrowed lower heel portions continuous with selvage edges in the widened heel portions, knitting the stocking foot integral with the lower heel portions and continuing the inward transfer of marginal groups of loops at opposite sides of the blank in progressive courses of the instep sole areas forwardly of the narrowed lower heel portions, the narrowing in the instep portions being effected by groups of marginal loops which progressively change in number in progressive narrowing courses.

22. The method of making a full fashioned stocking blank in a single operation according to claim 21, wherein the transfer narrowing in the instep portions is effected in progressive narrowing courses by diminishing marginal groups of loops.

23. The method of making a full fashioned stocking blank in a single operation according to claim 21, wherein the narrowing in the lower heel portions is effected in progressive courses by the transfer of marginal groups containing the same number of loops, and the narrowing in the instep portions is effected in progressive courses by the transfer of diminishing marginal groups of loops.

24. A full fashioned flat-knit stocking formed as a single unit including a heel pocket formed of complementary heel sections which are progressively widened along their back edges to an apex and progressively narrowed along their bottom edges below the apex, and a foot portion comprising complementary sole sections formed with the knitted wales thereof constituting integral continuations of wales of the heel sections, the

back and bottom edges of the heel sections and the edges of the foot sole sections being continuous and joined in a common seam, the knitted courses in the bottom of the heel pocket and in the foot sole extending transversely of said seam, the heel pocket comprising relatively stretchable reinforced fabric of loosely knit courses and being adapted to conform itself by stretching to the shape of the ball of the heel, the foot sole forwardly of the heel section in the region of the underside of the instep arch of the foot comprising less stretchable reinforced fabric of knitted courses so tightly knit as to cause the sole to closely fit the instep arch and thereby reduce the tendency of the relatively stretchable heel pocket to slide lengthwise of the ball of the heel.

25. A full fashioned flat-knit stocking formed as a single unit including a heel pocket formed of complementary heel sections which are progressively widened along their back edges to an apex and progressively narrowed along their bottom edges below the apex, and a foot portion comprising complementary sole sections formed with the knitted wales thereof constituting integral continuations of wales of the heel sections, the back and bottom edges of the heel sections and the edges of the foot sole sections being continuous and joined in a common seam, the knitted courses in the bottom of the heel pocket and in the foot sole extending transversely of said seam, the heel pocket comprising relatively stretchable heavy reinforced fabric of loosely knit courses and being adapted to conform itself by stretching to the shape of the ball of the heel, the foot sole forwardly of the heel section in the region of the underside of the instep arch of the foot comprising less stretchable lighter reinforced fabric of knitted courses so tightly knit as to cause the sole to closely fit the instep arch and thereby reduce the tendency of the relatively stretchable heel pocket to slide lengthwise of the ball of the heel.

26. A full fashioned flat-knit stocking formed as a single unit including a heel pocket formed of complementary heel sections which are progressively widened along their back edges to an apex and progressively narrowed along their bottom edges below the apex, and a foot portion comprising complementary sole sections formed with the knitted wales thereof constituting integral continuations of wales of the heel sections, the back and bottom edges of the heel sections and the edges of the foot sole sections being continuous and joined in a common seam, the knitted courses in the bottom of the heel pocket and in the foot sole extending transversely of said seam, the heel pocket comprising relatively stretchable reinforced fabric of loosely knit courses composed of main and splicing yarns and being adapted to conform itself by stretching to the shape of the ball of the heel, the foot sole forwardly of the heel section in the region of the underside of the instep arch of the foot comprising less stretchable lighter reinforced fabric of knitted courses composed of main and splicing yarns colectively lighter than the yarns in the heel pocket, said sole courses being so tightly knit as to cause the sole to closely fit the instep arch and thereby reduce the tendency of the relatively stretchable heel pocket to slide lengthwise of the ball of the heel.

27. The method of making a full fashioned stocking in a single operation which includes knitting the top, leg and ankle portions, then forming heel sections composed of reinforced fabric courses, said heel courses being knit throughout their width with a long stitch so as to render the reinforced heel sections easily stretchable, and during the knitting of the heel sections gradually widening the same for a distance to an apex and thereafter narrowing the same for a distance to form the under portion of the heel, continuing the knitting after completing the heel sections to form sole sections integral with the heel sections and composed of reinforced fabric courses, and in knitting the sole sections forwardly of the heel sections in the region of the underside of the instep arch of the foot reducing the size of the stitch so as to knit the foot sole courses of tight stitches adapted to render the foot sole sections in the instep area less stretchable than the fabric of the heel sections.

28. The method of making a full fashioned stocking in a single operation which includes knitting the top, leg and ankle portions with a body yarn, then forming heavily reinforced heel sections composed of knitted fabric courses formed of said body yarn and a plurality of splicing yarns knit with a relatively loose stitch and rendering the heel sections capable of substantial stretch, and during the knitting of the heel sections gradually widening the same for a distance down to an apex and thereafter gradually narrowing the same to form the lower portion of the heel, continuing the knitting after completing the heel sections to form sole sections integral with the heel sections, but at a suitable point in the instep area after completing the heel sections, changing the stitch and eliminating one of the splicing yarns to form tightly knit sole courses containing less yarn than the heel courses so that the sole sections comprise lighter reinforced fabric more resistant to stretch than the heel sections.

29. A full fashioned flat-knit stocking formed as a single unit including a heel pocket formed of complementary heel sections which are progressively widened along their back edges to an apex and progressively narrowed by loop transfer below the apex in marginal areas along their bottom edges, said heel sections being composed of relatively heavy and relatively stretchable loosely knit reinforced fabric adapted to conform itself by stretching to the shape of the ball of the heel, and a foot portion comprising complementary sole sections constituting integral continuations of the heel sections, said sole sections being narrowed by loop transfer in marginal areas along their edges, the fashioning lines defining the boundaries of the marginal instep fashioning areas inclining forwardly towards the edges, the sole sections in the instep area thereof at least forwardly of the front end of the instep fashioning lines being composed of lighter reinforced and more tightly knit fabric than the heel sections, the arrangement of the instep fashioning lines and the less stretchable fabric in the sole sections cooperating to cause the sole to closely fit the instep arch of the foot and reduce the tendency of the stretchable heel pocket to slide lengthwise of the heel.

JACOB A. GOODMAN.